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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,680	03/05/2002	Jiang Hsieh	120335	7220

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EXAMINER

SULLIVAN, JULIANNE M

ART UNIT

PAPER NUMBER

3737

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Please find below and/or attached an Office communication concerning this application or proceeding.

6

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/091,680	HSIEH, JIANG	
	<b>Examiner</b>	<b>Art Unit</b>	
	Julianne M. Sullivan	3737	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 April 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed April 28, 2005 have been fully considered but they are not persuasive.
2. In response to Applicant's argument regarding the double patenting rejection of Claims 3, 6, 15, 18, 24 and 26, the Examiner directs Applicant's attention to MPEP § 804. A double patenting rejection is proper between an issued patent (here, U.S. Patent No. 6,115,487) and a currently pending application. A *provisional* double patenting rejection is only proper when the reference is *another application*. Therefore, the double patenting rejection will be maintained.
3. In response to Applicant's argument that there is no suggestion to combine the Mattson et al. (U.S. Patent No. 5,229,934) and Snyder et al. (U.S. Patent No. 5,923,775) references, the Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, motivation to combine the Mattson et al. and Snyder et al. teachings is found in both references. Contrary to Applicant's assertion that the statement of obviousness was merely a "conclusory statement," the motivation provided in Snyder et al. was cited in the first Office Action. Applicant's attention is directed first to Snyder et al. at column 1, lines 21-30 and 60-61, where Snyder et al. teaches that beneficial to reduce the noise in images through post-acquisition processing, which is the technique taught in Mattson et al. (as evidenced, for

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example, by the title of the reference: "Post-processing Technique for Cleaning up Streaks and Artifacts in Diagnostic Images"). Next, Applicant's attention is directed to Mattson et al. at column 1, lines 7-15, where Mattson et al. teach that their technique may be applied in images generated using convolution. Snyder et al. teaches that a preferred method of calculating the gradient magnitude for the gradient image is through convolution of the image (col. 3, lines 29-38). Therefore, there is sufficient motivation to combine these references in order to improve the reduction of noise or artifacts in images.

4. In response to Applicant's argument that the Examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the Applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

5. In response to Applicant's argument that the Mattson et al. reference teaches away from the Snyder et al. reference and the present application (Applicant's Remarks filed April 28, 2005, hereinafter "Remarks," pp. 10-11), the Examiner first directs Applicant's attention to the response above regarding the motivation to combine the references. Second, Applicant argues that Mattson et al. teaches away from both Snyder et al. and the current application (Remarks, p. 10, last para.), and then argues that Mattson et al. and Snyder et al. both correct for the same type of errors (Remarks, p. 11, first para.), which would appear to contradict the initial argument. Further, Applicant argued that the references' teaching of correction of equipment- or machine-

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based errors teaches away from the correction of errors resulting from variations in the anatomy of the subject. It is noted that the feature upon which applicant relies (i.e., variation in the anatomy) was not recited in the rejected claims; however, the feature has been added to the claims in the current amendment. As such, the Examiner has introduced a new reference, Labaere et al. (U.S. Patent No. 5,717,791) to meet the new limitations, as discussed in the rejection below.

6. Applicant next argued that no combination of the Mattson et al. and Snyder et al. references teaches generating a gradient image using the estimated gradient wherein the gradient image represents a variation of the high density object in z or teaches generating an error-candidate projection using the gradient image. With respect to the “generating a gradient image using the estimated gradient wherein the gradient image represents a variation of the high density object in z” limitation, that argument will be addressed in the rejection below with the new reference, Labaere et al., as cited above. With respect to the “generating an error-candidate projection using the gradient image” limitation, this feature is taught by Mattson et al. Applicant’s attention is directed to Mattson et al. at column 5, lines 8-20 and column 6, lines 13-17, where Mattson et al. teaches a forward projection of the bad data (the error-candidates) determined using the gradient image. Accordingly, the rejection of independent Claims 1, 13 and 22, and the associated dependent claims, is maintained below.

7. In response to Applicant’s argument that there is no suggestion to combine the Mattson et al. and Snyder et al. references with Toth et al. (U.S. Patent No. 6,115,487), motivation to combine can be found in the Toth et al. reference. Applicant’s attention is directed to Toth et al. at column 6, lines 24-39, where Toth et al. teach that the method can be applied to projection

data and be used to define an error image via filtering and backprojection, as occurs in Mattson et al. Therefore, there is sufficient motivation to combine these references in order to improve the error correction process.

8. With respect to Applicant's remaining arguments regarding the claims rejected over Mattson et al. in view of Snyder et al. and further in view of Toth et al., it is noted that Applicant argued only that the limitations of the independent Claims 1, 13 and 22 were not met by this combination of references, but did not argue that the features of the dependent claims were not taught. The Examiner also notes that none of the independent claims were rejected using the Toth et al. reference. Applicant's arguments regarding the features of the independent claims were addressed above; therefore they will not be discussed again here.

9. In response to Applicant's argument that there is no suggestion to combine the Mattson et al., Snyder et al. and Toth et al. references with Florent et al. (U.S. Patent No. 5,594,845), motivation to combine can be found in the Florent et al. reference. Contrary to Applicant's assertion that the statement of obviousness was merely a "conclusory statement," the motivation provided in Florent et al. was cited in the first Office Action. Applicant's attention is directed to Florent et al. at column 2, lines 32-38, where Florent et al. teaches that scaling according to that invention can be used to achieve results in the reconstruction of images without the usual complexity of operations. Applicant's also argued that the uses of the term "scale" or "scaling" in the two references differ and preclude their combination, however Toth et al. teaches a scaling process involving a fitting polynomial, a CT number scale factor and an apodizing window (col. 2, lines 13-21 and col. 4, lines 43-60), not the CT number scale factor alone, as Applicant asserted. This combined scaling process is compatible with the geometrical scaling of Florent et

al. because the apodizing window has a similar role of limiting the range of the function, allowing smooth transitions and alignment of the error image with the original calibration image.

Additional attention is directed to Toth et al. at column 1, lines 56-59, where Toth et al. teaches that it would be desirable to reduce artifacts without increasing costs. Because it is well understood that costs can be reduced by simplifying the processes and operations performed, it would have been obvious to simplify the operations in order to achieve the lower costs. Therefore, there is sufficient motivation to combine these references in order to improve the error correction process.

10. With respect to Applicant's remaining arguments regarding the claims rejected over Mattson et al. in view of Snyder et al. and further in view of Toth et al. and Florent et al., it is noted that Applicant argued only that the limitations of the independent Claims 1, 13 and 22 were not met by this combination of references, but did not argue that the features of the dependent claims were not taught. The Examiner also notes that none of the independent claims were rejected using the Florent et al. reference. Applicant's arguments regarding the features of the independent claims were addressed above; therefore they will not be discussed again here.

11. In response to Applicant's argument that there is no suggestion to combine the Mattson et al. and Snyder et al. references with Moore et al. (U.S. Patent No. 4,222,104), motivation to combine can be found in the Moore et al. reference. Contrary to Applicant's assertion that the statement of obviousness was merely a "conclusory statement," the motivation provided in Moore et al. was cited in the first Office Action. Applicant's attention is directed to Moore et al. at column 4, lines 8-19, where Moore et al. teaches that the use of parallel beam projections is a simple and straightforward means of obtaining projections, such as those in Mattson et al.

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Therefore, there is sufficient motivation to combine these references in order to improve the error correction process.

12. With respect to Applicant's remaining arguments regarding the claims rejected over Mattson et al. in view of Snyder et al. and further in view of Moore et al., it is noted that Applicant argued only that the limitations of the independent Claims 1, 13 and 22 were not met by this combination of references, but did not argue that the features of the dependent claims were not taught. The Examiner also notes that none of the independent claims were rejected using the Moore et al. reference. Applicant's arguments regarding the features of the independent claims were addressed above; therefore they will not be discussed again here.

#### ***Double Patenting***

13. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).



Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

14. Claims 3, 6, 15, 18, 24 and 26 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1 and 3 of U.S. Patent No. 6,115,487 to Toth et al. in view of Snyder et al. (U.S. Patent No. 5,923,775).

Although the conflicting claims are not identical, they are not patentably distinct from each other because Toth et al. teaches the features of the present invention, including a correction method where the error image is scaled corresponding to the angle and subtracting the error image to produce an improved image, except for expressly teaching the use of an estimated gradient to generate the gradient image and the production of an error projection from the gradient image. In the same field of endeavor, Snyder et al. teaches the use of a gradient image from an estimated gradient, used to produce an error projection (col. 1, lines 65-67, col. 2, lines 8-9 and col. 3, lines 29-35 and 55-62). It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the scaling and subtraction methods of Toth et al. to the gradient images and error projections of Snyder et al. in order to produce an image with reduced artifacts.

### ***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 1, 2, 5, 7, 10-14, 17 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattson et al. (U.S. Patent No. 5,229,934) in view of Snyder et al. (U.S. Patent No. 5,923,775) and Labaere et al. (U.S. Patent No. 5,717,791).

Mattson et al. teaches a method and computer, which is used in a CT system having a radiation source and detector array, for reconstructing an image that includes producing an error projection using a gradient image, where the error projection is produced by forward projecting the gradient along a projection view angle, where the error projection is used to construct an error image and where a final image is generated by subtracting the error image from the original image (col. 3, lines 11-14 and 18-24, col. 4, lines 49-64, col. 5, lines 8-10 and col. 6, lines 13-17 and 34-38). Mattson et al. does not teach using an estimated gradient to generate the gradient image, where the gradient image represents a variation of the high density object in z, where the gradient is produced by comparing three or more images with some threshold value, or using a segmentation technique to produce different gradient images, where the technique involves using different threshold values for different classes of objects.

In the same field of endeavor, Snyder et al. teaches a gradient estimation system that is used to estimate a gradient by comparing three or more images to a threshold value to produce a gradient image, which can then be used in image reconstruction (col. 1, lines 65-67, col. 2, lines 8-9 and 14-20 and col. 3, lines 29-35). Snyder et al. further teaches the use of a segmentation technique to produce different gradient images where the segmentation technique provides a plurality of threshold values (col. 3, lines 40-44 and col. 5, lines 25-52). Also in the same field of endeavor, Labaere et al. teaches the use of gradient images corresponding to sharp variations, such as between tissue and bone (col. 1, lines 60-67 and col. 2, lines 1-4 and 53-67). It would

have been obvious to one of ordinary skill in the art at the time of the invention to have used the techniques of Snyder et al. to produce the gradient images, such as those in Labaere et al., used in Mattson et al. to estimate and reduce the noise or artifacts in images and thereby improve image quality (see for motivation Mattson et al. at col. 1, lines 7-15 and the title, Snyder et al. at col. 1, lines 21-30 and 60-61 and col. 3, lines 29-38 and Labaere et al. at col. 2, lines 64-67).

17. Claims 3, 6, 8, 15, 18, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattson et al. in view of Snyder et al. and Labaere et al. as applied to Claims 1, 13 and 22 above, and further in view of Toth et al. (U.S. Patent No. 6,115,487).

Mattson et al. in view of Snyder et al. teach all of the features of the present invention except for expressly stating that the error candidate image is scaled based upon the view angle or that it is helically weighted. In the same field of endeavor, Toth et al. provides a correction method where the error image is scaled corresponding to the angle and a method using helically weighted error data (col. 2, lines 13-21, 42-46 and 54-63). It would have been obvious to one of ordinary skill in the art at the time of the invention to have scaled or weighted the error image of Mattson et al. with the method of Toth et al. in order to improve the error correction process (see for motivation Toth et al. at col. 6, lines 24-39).

18. Claims 4, 16 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattson et al. in view of Snyder et al. and Labaere et al., and further in view of Toth et al. as applied to Claims 3, 15 and 24 above, and further in view of Florent et al. (U.S. Patent No. 5,594,845).

Mattson et al. in view of Snyder et al. and Toth et al. teach all of the features of the present invention except for expressly stating that the scaling of the error projection was based

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upon the projection view angle, center view angle, pitch and size of the detector array. In the same field of the endeavor, Florent et al. teaches an image processing method where scaling is based upon the panning angle, the center angle, the tilting angle and the size (col. 2, lines 42-62). Here, the Examiner has interpreted the dependence of the scaling on the number of pixels in the target array as equivalent to Applicant's use of detector array size. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the scaling scheme from Florent et al. in the scaling method of Toth et al. in order to reduce the complexity of the image processing method (see for motivation Toth et al. at col. 1, lines 56-59 and Florent et al. at col. 2, lines 32-38).

19. Claims 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattson et al. in view of Snyder et al. and Labaere et al. as applied to Claims 1 and 13 above, and further in view of Moore (U.S. Patent No. 4,222,104).

Mattson et al. in view of Snyder et al. teach all of the features of the present invention except for explicitly stating that the forward projection of the gradient is either a fan beam or parallel beam forward projection. In the same field of endeavor, Moore teaches that parallel beam forward projections are very well known in image processing techniques (col. 7, lines 12-19). It would have been obvious to one of ordinary skill in the art at the time of the invention to have generated the error image from the gradient image through the use of a parallel beam forward projection in order to provide a simple procedure for the generation of the image (see for motivation Moore at col. 4, lines 8-19).

***Conclusion***

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julianne M. Sullivan whose telephone number is 571-272-6084. The examiner can normally be reached on Monday through Friday 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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